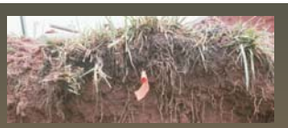
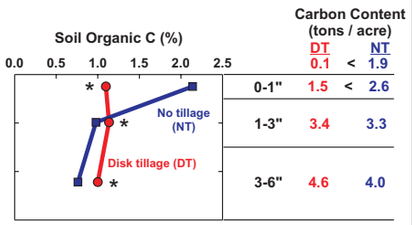
Tips to Sequester Soil Organic Carbon



A - Tillage system

Plow tillage buries residues, disrupts macroaggregates, increases aeration, and stimulates microbial breakdown of soil organic matter.

In contrast, when crop residues are left on the soil surface with conservation tillage, they protect the soil against erosion, increase water infiltration, decrease soil waterevaporation, and increase soil organic C.



	Carbon Content (tons / acre) DT		NT
0-1"	0.1	<	1.9
1-3"	1.5	<	2.6
3-6"	3.4		3.3
	4.6		4.0
Sum of soil profile (0-6")	9.4		9.9
Sum of soil + residue	9.5	<	11.8

B - Crop rotation

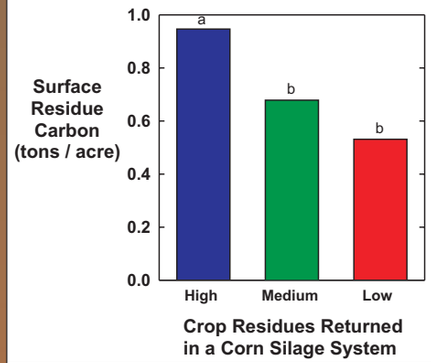
Crop rotation is necessary to avoid plant diseases, reduce weed pressures, improve nutrient cycling, and improve crop quality and yield. Rotation of low- and high-residue producing crops can balance both economic and environmental issues for a more sustainable production system.

Crop residue production of typical crops in the southeastern USA are:

Crop	Crop Residue C (tons / acre / year)
Corn	1.4 - 2.5
Sorghum	1.0 - 1.5
Wheat	0.6 - 1.1
Cotton	0.5 - 0.9
Peanut	0.6 - 0.7
Soybean	0.4 - 0.7

C - Crop residue management

Crop residues are a valuable C source in cropping systems that feed the soil biota and promote efficient nutrient cycling. Repeated harvest or burning of residues limits the potential of soil to accumulate C.



D - Cover cropping

Cover crops are valuable in cropping systems, because they:

(1) protect the soil from water runoff, wind and water erosion, and nutrient leaching
(2) suppress weeds
(3) control pests
(4) promote sequestration of soil organic C.

Across several studies in the southern US, the rate of soil organic C sequestration with conservation tillage compared with conventional tillage was:

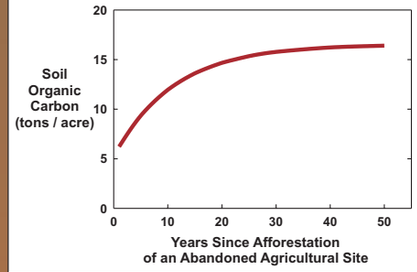
	Soil organic C (tons / acre / year)
without cover crop	0.15
with cover crop	0.30

E - Forest management

Forests are a large sink for organic C, primarily in the form of wood, but also in surface litter and soil organic matter.

In a 55-year-old pine plantation, carbon distribution within the surface foot of soil was:

	tons / acre
Forest floor litter	5.3
Soil organic C	10.5
Roots and root channels	7.4



F - Pasture grazing strategy

Rotational grazing forces animals to consume all forage within a smaller paddock with a long resting period for forage recovery and growth. Forage quality is typically higher with rotational grazing than with continuous grazing.

Continuous grazing allows large land areas to be consumed according to animal preference. One concern is that some areas will be overgrazed and others will be undergrazed.

Unfortunately, data to support the effect of grazing strategy on soil organic C accumulation are not available.

G - Fertilizer management

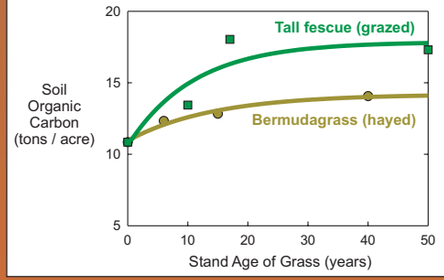
Recycling of nutrients from animal manures to pastures is an effective strategy to avoid environmental disposal issues. Animal manure can be a valuable resource for improving overall soil fertility from the diversity of nutrients it supplies, as well as the additional carbon supplied to soil.

Application of excessive fertilizer can contaminate surface and groundwater and is an economic burden.

Soil organic C has been shown to increase by 0.12 tons / acre / year with poultry litter compared with inorganic N.

H - Pasture composition

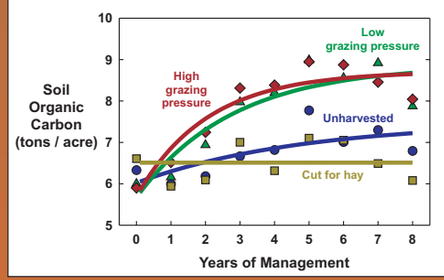
Whether pastures are dominated by warm-season (e.g. bahiagrass, bermudagrass, switchgrass) or cool-season (e.g. tall fescue, ryegrass, orchardgrass) grasses will affect the timing of forage utilization. Although above-ground growth feeds the grazing animals, below-ground growth feeds the soil biota, which ultimately determine fate of carbon in soil.



I - Pasture utilization

Grazing of pastures allows manure from animals to recycle directly onto the pasture, thereby leading to an accumulation of soil organic C.

Cutting pasture for hay removes a large amount of carbon and nutrients from the pasture that must be replenished with additional fertilizer inputs for sustained productivity.



J - Urban land management

In a five-state region (GA, SC, NC, TN, KY), the American Farmland Trust estimates that 171,000 acres of farmland are being developed for suburban use each year.

Land stewardship is a responsibility of all landowners and managers, whether they are in agricultural or urban settings.